

1        CLAIMS

2  
3        We claim:

4  
5            1.     A method for treating a patient for a bone  
6        related condition comprising the steps of:  
7            measuring a bone characteristic level in a bone of  
8        said patient to yield a first score having a value;  
9            conducting a gait analysis on said patient to yield a  
10       first gait characterization;  
11           measuring a bone marker concentration in at least one  
12       body fluid of said patient to yield a first bone marker  
13       level having a value; and  
14           prescribing a therapy based on at least one of said  
15       first score, said first gait characterization and said bone  
16       marker level value.

17  
18           2.     The method of claim 1 wherein the bone  
19        characteristic level is measured using a bone  
20        characteristic measuring unit, comprising:  
21           a space for housing a portion of said patient;  
22           a positioning device for holding said portion;  
23           a plurality of ultrasound transducers for transmitting  
24        and detecting signals; and  
25           an output for outputting said first score value.

26  
27           3.     The method of claim 2 wherein the bone  
28        characteristic is a quantitative ultrasound index.

29  
30           4.     The method of claim 2 wherein the bone  
31        characteristic is a stiffness index.

1           5.     The method of claim 1 wherein the bone  
2 characteristic level is measured using X-ray  
3 absorptiometry.  
4

5           6.     The method of claim 1 wherein the bone  
6 characteristic level is measured using quantitative  
7 ultrasonometry.  
8

9           7.     The method of claim 1 wherein the bone  
10 characteristic level is measured using quantitative  
11 computed tomography.  
12

13          8.     The method of claim 1 wherein the bone  
14 characteristic is bone mineral density.  
15

16          9.     The method of claim 1 further comprising the step  
17 of assessing a plurality of risk factors attributable to  
18 the patient.  
19

20          10.    The method of claim 9 wherein said therapy is  
21 prescribed based at least in part upon the assessment of  
22 said risk factors.  
23

24          11.    The method of claim 1, wherein the first score is  
25 a T-score.  
26

27          12.    The method of claim 1 wherein said therapy is  
28 prescribed based upon an output of an integrated unit  
29 having received the first value, the gait characterization,  
30 and the bone marker level value.  
31

1        13. The method of claim 12, wherein said integrated  
2 unit comprises a receiver in data communication with a  
3 processing unit and a display unit in data communication  
4 with the processing unit.  
5

6        14. The method of claim 1 further comprising the step  
7 of determining a likelihood of said patient injuring one of  
8 a plurality of bones of said patient.  
9

10       15. The method of claim 1 wherein the bone marker  
11 level is measured by a bone marker measurement device,  
12 wherein said device comprises:  
13        a container containing a body fluid;  
14        a mechanism for holding the said container;  
15        an analyzer for determining a concentration of an  
16 absorbing constituent in a solution; and  
17        an output for outputting the first bone marker level  
18 value.  
19

20       16. The method of claim 1 wherein the gait analysis  
21 is characterized by a gait analysis procedure conducted on  
22 said patient having a balance, wherein said procedure  
23 comprises the steps of:

24        examining the balance of the patient wherein the  
25 patient is standing on both feet;

26        examining the balance of the patient wherein the  
27 patient is standing on a first foot; and

28        examining the balance of the patient wherein the  
29 patient is standing on a second foot.  
30

31       17. The method of claim 1 wherein the gait analysis  
32 is characterized by a gait analysis procedure conducted on

1 said patient having a balance, wherein said procedure  
2 comprises the steps of:  
3 having the patient stand on a plurality of platforms;  
4 detecting pressure exerted on said plurality of  
5 platforms; and  
6 determining a pressure differential on said plurality  
7 of platforms.

8

9 18. The method of claim 1 wherein said therapy  
10 includes at least one of recommending life style changes,  
11 recommending weight bearing exercises, and recommending  
12 resistance exercises.

13

14 19. The method of claim 1 wherein said therapy  
15 includes at least one of recommending increasing calcium  
16 intake and recommending increasing vitamin D intake.

17

18 20. The method of claim 1 wherein said therapy  
19 includes recommending at least one of bisphosphonates,  
20 calcitonin, estrogen replacement therapy, and raloxifene.

21

22 21. The method of claim 1 further comprising the  
23 steps of:

24 within a first pre-defined time period, re-measuring a  
25 bone characteristic level in said bone to yield a second  
26 score having a value;

27 within a second pre-defined time period, re-conducting  
28 a gait analysis to yield a second gait characterization;  
29 and

30 within a third pre-defined time period, re-measuring a  
31 bone marker concentration in the at least one body fluid of

1 said patient to yield a second bone marker level having a  
2 value;

3 comparing the first score to the second score, the  
4 first gait characterization to the second gait  
5 characterization, and the first bone marker level to the  
6 second bone marker level, and;

7 prescribing a therapy based upon at least one of said  
8 comparisons.

9

10 22. The method of claim 21 wherein said first, second  
11 and third pre-defined time periods are different periods of  
12 time.

13

14 23. The method of claim 1 wherein a plurality of bone  
15 characteristic levels are measured from a plurality of  
16 bones of said patient.

17

18 24. The method of claim 1 wherein the step of  
19 prescribing a therapy is based on said measurement of a  
20 bone characteristic level, said gait analysis, and said  
21 measurement of a bone mass marker concentration.

22

23 25. The method of claim 1 further including the step  
24 of designating a future time to repeat said measurement of  
25 a bone characteristic level, said gait analysis, and said  
26 measurement of a bone mass marker concentration.

27

28 26. The method of claim 25 wherein said future time  
29 to repeat said measurement of a bone characteristic level  
30 is during the twelfth month from the previous measurement.

31

1        27. The method of claim 25 wherein the step of  
2 designating a future time to repeat said gait analysis  
3 includes scheduling a series of eight gait analyses over a  
4 period of time.

5  
6        28. The method of claim 25 wherein said future time  
7 to repeat said gait analysis is between one and four months  
8 from the previous analysis.

9  
10       29. The method of claim 25 wherein said future time  
11 to repeat said gait analysis is once a week for eight  
12 consecutive weeks.

13  
14       30. The method of claim 25 wherein said future time  
15 to repeat said gait analysis is once every two weeks for  
16 sixteen consecutive weeks.

17  
18       31. The method of claim 25 wherein said future time  
19 to repeat said bone marker measurement is between two to  
20 four months.

21  
22       32. The method of claim 25 wherein said future time  
23 to repeat said bone marker measurement is during the third  
24 month from the previous measurement.

25  
26       33. The method of claim 1 wherein said steps of  
27 measuring a bone characteristic level, conducting a gait  
28 analysis and measuring a bone marker concentration may be  
29 performed in any order.

30

1        34. The method of claim 1 wherein said step of  
2 conducting a gait analysis is based on the value of said  
3 first score.

4        35. A system for treating a patient for a bone  
5 related condition comprising:

6        a bone characteristic measurement unit having an  
7 output for communicating a bone characteristic level value;

8        a gait analysis unit having an output for  
9 communicating a gait characterization; and

10       a bone marker measurement unit having an output for  
11 communicating a bone marker level value.

12  
13       36. The system of claim 35 wherein said bone  
14 characteristic measurement unit comprises a space for  
15 housing a portion of said patient, a positioning device  
16 connected to said chamber for holding said portion, a  
17 plurality of ultrasound transducers for transmitting and  
18 detecting signals, and an output for outputting the bone  
19 characteristic level value.

20  
21       37. The system of claim 35 wherein the gait analysis  
22 unit comprises at least two pressure sensitive platforms.

23  
24       38. The system of claim 35 wherein the bone  
25 characteristic measurement unit is a X-ray absorptiometry  
26 unit.

27  
28       39. The system of claim 35 wherein the bone  
29 characteristic measurement unit is a quantitative  
30 ultrasonometry unit.

1           40. The system of claim 35 wherein the bone  
2 characteristic measurement unit is a quantitative computed  
3 tomography unit.  
4

5           41. The system of claim 35 wherein the bone marker  
6 measurement unit comprises a container containing a body  
7 fluid, an analyzer for determining a concentration of an  
8 absorbing constituent in a solution, and an output for  
9 outputting the bone marker level value.  
10

11           42. The system of claim 35 further comprising an  
12 integrated unit in data communication with a processing  
13 unit for outputting a recommendation, wherein said  
14 integrated unit is in data communication with the outputs  
15 of said bone characteristic measurement unit, said gait  
16 analysis unit, and said bone marker measurement unit,  
17 wherein said recommendation is determined by the processing  
18 unit based upon the bone characteristic level value, gait  
19 characterization, and bone marker level value.  
20

21           43. A method for treating a patient for a bone  
22 related condition comprising the steps of:

23           instructing a medical practitioner to measure a bone  
24 characteristic level in at least one of said plurality of  
25 bones of said patient to yield a score having a value;

26           based upon the value of said score, instructing the  
27 medical practitioner to conduct a gait analysis of said  
28 patient to yield a gait characterization;

29           based upon the value of said score and the said gait  
30 characterization, instructing the medical practitioner to  
31 measure a bone marker concentration in at least one body



1 fluid of said patient to yield a bone marker level having a  
2 value;

3 providing the medical practitioner with a plurality of  
4 therapies that can be prescribed; and

5 instructing the medical practitioner to designate a  
6 future time to repeat said measurement of a bone  
7 characteristic level, said gait analysis, and said  
8 measurement of a bone marker concentration.

9

10 44. A method for treating a patient for a bone  
11 related condition comprising the steps of:

12 measuring a bone characteristic level in a bone of  
13 said patient to yield a T-score having a value;

14 if the T-score is abnormal, conducting a gait analysis  
15 to yield a gait characterization;

16 if the gait characterization is abnormal, measuring a  
17 bone marker concentration in at least one body fluid of  
18 said patient to yield a bone marker level having a value;

19 prescribing a therapy based on at least one of the  
20 said gait characterization, said T-score, and bone marker  
21 level; and

22 designating a future time to repeat said measurement  
23 of a bone characteristic level, said gait analysis, and  
24 said measurement of a bone marker concentration.

25

26 45. The method of claim 44 wherein said future time  
27 to repeat said measurement of a bone characteristic level  
28 is during the twelfth month from the previous measurement.

29

30 46. The method of claim 44 wherein the step of  
31 designating a future time to repeat said gait analysis

1 includes scheduling a series of eight gait analyses over a  
2 period of time.

3

4 47. The method of claim 44 wherein said future time  
5 to repeat said bone marker measurement is during the third  
6 month from the previous measurement.

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